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EPA GRO Summer Internship Final Report

Pennsylvania Project

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During the summer of 2010 I participated in an internship at the EPA's Western Ecology Division (WED) in Corvallis, OR. During my stay in Corvallis, I worked with Dr. Dave Olszyk, terrestrial ecologist, who is currently working on the Pennsylvania Project, which was formed to determine the ecological effects of combined herbicide applications on native plants. Little is known about the effects of combined herbicides on native plants. Conversely, much is known about single herbicide applications on native plants. These chemical applications are used in agricultural practices and would not be of ecological importance or concern if it were not for drift events. During the application process the herbicides can drift from the targeted area to the surrounding areas.

The specific purpose of the Pennsylvania Project is to determine if the herbicides Banvel™ and Roundup™ have any effect on native plants. Additionally, the two herbicides were combined to determine what effect they would have on plants when both were used. Herbicide solutions were diluted to 0.1 and 0.01 concentrations in order to simulate the concentration of drifted chemicals. The following nine native plants were used in this study: *Eriophyllum lanatum* (ERLA), *Elymus glaucus* (ELGL), *Prunella vulgaris* (PRVU), *Iris tenax* (IRTE), *Camassia leichtlinii* (CALE), *Festuca roemerii* (FERO), *Ranunculus occidentalis* (RAOC), *Frageria virginiana* (FRVI), and *Potentilla gracilis* (POGR). The nine native plants were placed in plots which consisted of three rows of three plants. There were a total of 400 plots, which were divided into two locations (Botany Farm and Hyslop). Plots were treated with either a control (no spray); Banvel (0.01 and 0.1 concentration); Roundup (0.01 and 0.1 concentration); Roundup mixed with Banvel (0.01 and 0.1 concentration); and a carrier control (0.01 and 0.1 concentration).

Data were collected once a week for one location (the other location was visited the following week). The data collected were measurements of percent ground cover. Additionally, the reproductive statuses of the plants were monitored and seeds were collected. The following plant species at Botany Farm were negatively affected in terms of percent ground cover due to the application of herbicides: RAOC (mixed herbicides), ELGL (Roundup and mixed herbicides), FRVE (Roundup), and PRVU (Banvel and mixed herbicides). The following plant species at Hyslop also showed negative responses to herbicide applications: ERLA (mixed herbicides), RAOC (mixed herbicides), CALE (Banvel), and FRVE (Banvel, Roundup, and mixed herbicides).

The results from the Pennsylvania Project indicate that some native plant species are negatively affected by low levels of herbicides (both combined and single herbicide applications). This fact has many implications for plant ecology and herbicide policies. The results obtained indicate that herbicide applications can be causing negative ecological affects around agricultural areas across the Nation. Because these effects occur at low concentrations, it is imperative to minimize drift occurrences (which can be difficult to manipulate). It is my opinion that ecological assessments should be conducted around agricultural areas in order to determine if native ecologies are being harmed by herbicide application processes.

I was quite impressed by the scientific standards of the Western Ecology Division Laboratory. There were many procedures in place to insure data collection was accurate and consistent. One such procedure involved taking a weight measurement with an electronic scale of a metal weight with a known weight value. Once this metal weight is measured, the value obtained is then compared to the actual known value of the metal weight. This procedure allows one to determine the accuracy of the scale. Additionally I liked how records were kept and archived. It is important to archive data so that they can be reexamined in the future (if needed). All the employees at the lab are very nice and are willing to help. The EPA's mission is a worthwhile endeavor that is essential for maintaining a healthy environment. I got to see firsthand how EPA employees play their part in protecting the environment by obtaining knowledge and using this knowledge.

During my stay in Corvallis my plans to get a Ph.D. in chiropterology (the study of bats) were strengthened because not seeing bats for three months made me realize how much I enjoy working with them. Conversely, my convictions to never work for a government agency have weakened. I would now be more open to government employment now that I see politics do not permeate and corrupt the science that is conducted (at least not at a detectable level). However, I still remain skeptical with regards to the assertion that politics do not corrupt the pursuit of knowledge. I discovered that I would not mind getting a second degree in a plant-related field, like ecology. The reasoning for this is that an understanding of plants can be useful in terms of understanding roosting behavior in bats. Unfortunately I did not gain any new abilities, but I did refine previously obtained abilities (Excel spread sheet organization for example). I did however learn some new techniques (for example, I learned to repeat some measurements so that one can ascertain the accuracy of data collection). I will use this new technique whenever I collect data for my experiments back home.

My overall impression of my internship was good, but I do think there is room for improvement. It would be ideal if interns could know exactly what they will be doing and what skills would be needed or learned to achieve their duties. I realize this would be really hard to do but it is something to consider. My biggest piece of advice for future GRO interns is to take on additional projects or responsibilities. During my stay at WED, I talked to the other researchers and created a personal project with another researcher other than my advisor. This allowed me to learn a lot about allelopathy and helped me refine my experimental design skills. Taking on additional projects will optimize the growth of the intern and will give him/her a better idea of the work that is conducted by other staff members.